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RECORDS AND DESCRIPTIONS OF FLEAS FROM PERU

(SIPHONAPTERA)[1]

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Since the discovery of sylvatic plague in South America, considerable interest has been expressed in the flea fauna of the indigenous rodents. Macchiavello (1948) reported the occurrence of thirty-seven species of fleas in Peru, including three species previously reported by Fuller (1942). Jordan (1950), working on a collection of Peruvian fleas submitted as a result of a plague survey conducted by Dr. Macchiavello, listed five species not previously reported and, in addition, described four new species. The present paper lists records of nine species. Descriptions of three new species of *Agastopsylla* J. & R., 1923 are included, as is the description of the male of *Tetrapsyllus bleptus* (J. & R., 1923). As a result, the total number of species of fleas now known to occur in Peru is fifty.

The descriptions are presented first; the list of records follows, arranged according to a phylogenetic classification of the fleas involved. Most of these fleas were collected by O. P. Pearson and were received for study through the cooperation of Dr. Joseph Bequaert, of the Museum of Comparative Zoology, Harvard University, and Dr. H. S. Fuller, of the Harvard University Medical School. For purposes of convenience, pertinent records of fleas collected by C. C. Sanborn, of the Chicago Natural History Museum, are included at the present time.

Family HYSTHICHOPSYLLIDAE

Subfamily CTENOPHTHALMINAE

Agastopsylla pearsoni, new species

Figs. 1-10.

Types.—Holotype male and allotype female ex "*Chinchillula sahamae, Akodon pulcherrimus cruceri* or *Phyllotis pictus;*" PERU: Puno, Picotani, 15 Sept. 1941, coll. C. C. San-

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born for the Chicago Natural History Museum; deposited in collections of that museum. A pair of paratypes with same data deposited in the British Museum (Natural History), Tring. A paratype male with same data in the author's collection.

Diagnosis.—Near *A. boxi* J. & R. 1923, from Argentina (the only species heretofore known in the genus), but readily separable as follows: Male seventh tergum with bristles above antepygidial bristle simple, in two and a half rows, undifferentiated from those of preceding rows, whereas in *A. boxi* the seventh tergum bears numerous closely-packed bristles. In the new species the distal arm of the male ninth sternum (fig. 5, *D.A.9*)[2] is definitely narrower, its breadth being distinctly smaller than the longest axis of the sensilium, instead of being markedly greater. The digitoid (fig. 4, *F.*) is also relatively narrower, i.e., more than three times as long (measured from insertion at base to apex) as broad, instead of but slightly more than twice as long as broad. The bursa copulatrix (fig. 7, *B.C.*) has its apex slightly curved caudad, whereas in *A. boxi* the apex is curved sharply forward as in the symbol for a question mark. In both sexes the preantennal region of the head (figs. 1 and 10) bears three or four ventromarginal bristles, not two.

Description. Male.—Head (fig. 1). Frontoclypeal margin evenly rounded. (Much less rounded in female, fig. 10.) With an anterior row of approximately four small bristles; a long bristle near antennal groove shortly behind this row; a longer bristle above vestigial eye. Ventral margin of head with two to four fairly long bristles, all an-

[2]Abbreviations: *A.A.R.*, Aedeagal apodemal rod. *A.B.*, Antepygidial bristle. *AE.A.*, aedeagal apodeme. *A.I.T.*, Armature of inner tube. *A.M.S.*, Apico-median sclerite of aedeagus. *AP.S.*, Apodemal strut of aedeagus. *A.S.*, Anal stylet. *B.C.*, Bursa copulatrix. *BV.S.*, Bivalve sclerite. *CR.*, Crochet. *C.S.*, Crescent sclerite of aedeagus. *D.A.L.*, Dorsal anal lobe of proctiger. *D.A.9*, Distal arm of ninth strenum. *D.L.P.*, Dorsal lobe of proctiger. *D.S.*, Dorsal lobe of apodemal strut. *F.*, Digitoid or movable finger. *H.F.*, Hoodflaps of aedeagus. *HL.*, Heel at base of aedeagal pouch. *L.L.*, Lateral lobes of aedeagus. *L.M.*, Lateral metanotal area. *L.S.*, Lateral ventral lobe of apodemal strut. *MB.*, Manubrium. *M.D.L.*, Median dorsal lobe of aedeagus. *MPM.*, Mesepimere. *MPS.*, Mesepisternum. *M.S.*, Submedian mesal lobe of apodemal strut of aedeagus. *MSN.*, Mesonotum. *MST.*, Mesosternum. *MTM.*, Metepimere. *MTN.*, Metanotum. *MTS.*, Metepisternum. *P.*, Immovable process of clasper. *P.A.9*, Proximal arm of ninth sternum. *PL.A.*, Pleural arch of metathorax. *P.R.*, Penis rods. *P.S.*, Proximal spur. *P.W.*, Wall of aedeagal pouch. *R.*, Dorsal ridge of lateral metanotal area. *S.I.T.*, Sclerotized inner tube. *SN.*, Sensilium. *SP.*, Spermatheca. *SPR.*, Ventral spur of aedeagus. *7S.*, Seventh sternum. *8S.*, Eighth sternum. *1T.*, First tergum. *8T.*, Eighth tergum. *9T.*, Ninth tergum. *T.AP.9*, Apodeme of ninth tergum. *TR.A.*, Trough of aedeagus. *V.*, Vesicle. *V.A.L.*, Ventral anal lobe. *V.L.P.*, Ventral lobe of proctiger. *V.R.*, Ventral ridge of lateral metanotal area.

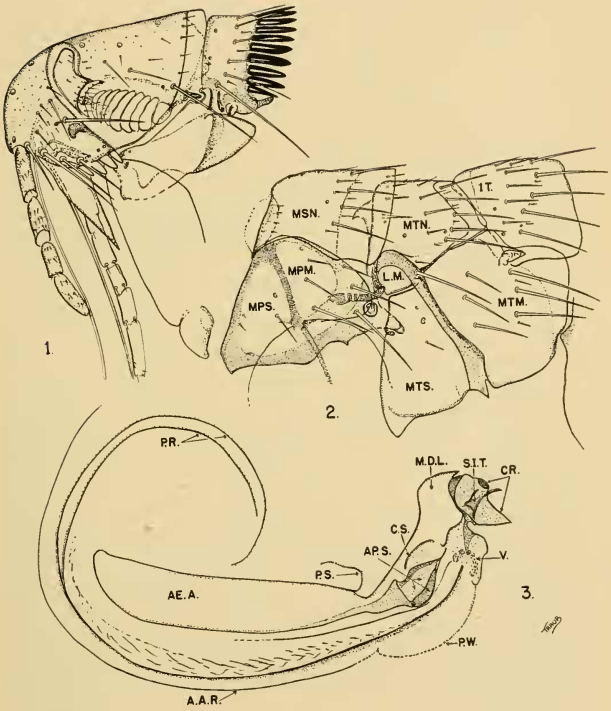

PLATE I. AGASTOPSYLLA PEARSONI

Fig. 1, head, male; fig. 2, thorax; fig. 3, aedeagus.

terior to genal ctenidium. Ctenidium of three to five (usually four) pale short spines, often difficult to see (four on one side and five on other in one specimen!). Maxillary lobe extending almost to apex of third segment of maxillary palpus. First maxillary palpal segment slightly longer than second. Labial palpi five-segmented, extending to near apex of foretrochanters. Scape of antenna with a few short proximal, median and apical bristles. Second antennal segment with bristles short, scarcely longer than the segment itself. Posterior margin of antennal groove distally bordered by a thin row of short hairs. Postantennal region with three long bristles above antennal groove (only two in one female); with one or two short bristles extending obliquely dorsad from the first of these; one or two similar small ones extending above the second; the marginal row complete, though all bristles small.

Thorax.—Pronotum with one row of bristles and a comb of about ten spines on a side; the longest spines about as long as pronotum. Mesonotum (fig. 2, *MSN.*) with two rows of bristles, the first much abbreviated and its bristles smaller. Mesonotal flange on each side with four pseudosetae. Mesepisternum (*MPS.*) with two caudal bristles and two very small ones near anterior margin. Mesepimere (*MPM.*) typically with six bristles arranged 3-3. Metanotum (*MTN.*) with two rows of bristles. Metepisternum (*MTS.*) apparently with three bristles. Lateral metanotal area (*L.M.*) distinct, about one and one-half times as high as broad; dorsal margin strongly convex; its ventral border not fused with metepisternum; with a long bristle at region where metanotum joins *L.M.* Lacking a pleural arch at junction of lateral metanotal ridge and pleural ridge (*cf.* fig. 23, *PLA.*). Metepimere (*MTM.*) of male usually with six long bristles arranged 3-3; in female with four long bristles (arranged 1-3).

Legs.—Procoxa with many lateral bristles scattered over entire length of segment. Meso- and metacoxae with relatively few such bristles and these marginal or submarginal. Coxae lacking mesal bristles. Profemora with one subapical ventral bristle and one submedian subproximal mesal small thin bristle. Meso- and metafemora with two or three subapical ventral bristles and one or two subproximal mesal bristles. Meso- and metatibiae (fig. 9, metatibia) with six dorsal notches bearing a pair of bristles, but apical (sixth) pair immediately above a third, inner, bristle; with a single dorsal bristle between the proximal second and third pairs, this flanked by a row of two subdorsal bristles; and, in addition, with ten to twelve lateral subdorsal bristles and with two or three small mesal median bristles.

Measurements of tibiae and segments of tarsi (petiolate base deleted) shown in microns for holotype:

		Tarsal Segments				
Leg	Tibia	I	II	III	IV	V
Pro-	120	39	43	32	28	76
Meso-	193	51	58	46	37	83
Meta-	244	174	115	66	42	85

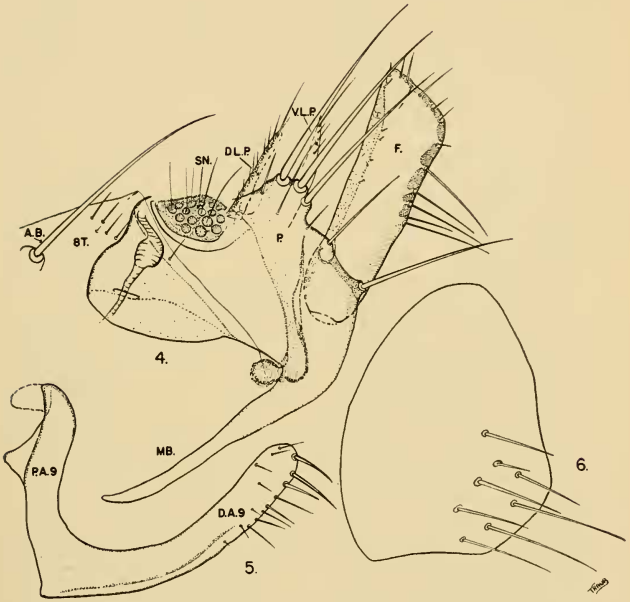

PLATE II. AGASTOPSYLLA PEARSONI

Fig. 4, claspers and tenth segment; fig. 5, ninth sternum; fig. 6, eighth sternum.

All apical tarsal bristles relatively short; only in hindtarsal segment II and at times in III does one extend beyond apex of next segment. Last segment of all tarsi with four pairs of lateral plantar bristles and a median small pair between those of first pair.

Abdomen.—First tergum (fig. 2, *1T.*) with two rows of bristles; a third row represented by but one or two bristles on a side. No lateral bristles on basal sternum. With an almost vestigial subdorsal tooth on each side of terga II. Typical terga with two complete rows of bristles (second extending to about level of lanceolate spiracles); with two or three anterior subdorsal bristles representing third row. Typical sterna with two or three subventral bristles on a side.

Modified Abdominal Segments. Male.—Eighth tergum (fig. 4, *8T.*) dorsally reduced to an area between antepygidial bristle (*A.B.*) and sensilium (*SN.*); with a few small thin bristles near fairly large spiracle. Eighth sternum (fig. 6) subovate, large, extending dorsad to about level of unmodified spiracles; with about eight bristles, all on ventrocaudal third or quarter.

Immovable process of clasper (fig. 4, *P.*) short, broad, rounded; caudal margin sinuate; with three long apical bristles preceded by two or three small ones (only two apical bristles in one paratype); with a single acetabular bristle near caudal margin of digitoid at point of insertion. On only *one* side, in both holotype and one paratype, with an additional marginal bristle between apical three and acetabular bristle. Digitoid or movable finger (*F.*) elongate-oblong, nearly four times as long as broad at maximum; obliquely truncate at apex; proximally somewhat narrowed, especially in one paratype; anterior upper angle extending farther distad than posterior upper angle, the latter more rounded; apical margin with six small bristles, that at midpoint longest; caudal margin usually with five or six longish bristles, uppermost near four-fifths mark.

Ninth sternum (fig. 5) boomerang-shaped; proximal arm (*P.A.9*) slightly shorter than distal arm, of approximately same width; with a prominent, lightly sclerotized lateral triangular expansion on apical half; proximal arm about three and one-half times as long as broad at triangle. Distal arm of ninth sternum (*D.A.9*) rounded distally; with a ventral row of about seven bristles, of which distal one or two are quite stout; an additional stout bristle at apex; with a few scattered smaller thinner bristles, of which about two are subapical, near dorsal margin.

Aedeagal apodeme (fig. 3, *AE.A.*) long, the portion between apex of apodeme and the well-developed proximal spur (*P.S.*) about five times as long as broad; apex subrounded. Wall of aedeagal pouch (*P.W.*) lightly sclerotized but apparent. Median dorsal lobe (*M.D.L.*) strongly arched subapically. Sclerotized inner tube (*S.I.T.*) short, relatively unmodified, oblique, ventral lip extending apicad of dorsal, and curving ventrad. Crochets (*CR.*) quite large, flanking the sclerotized inner tube and extending well above it to near median dorsal lobe and as far below it; the ventral extension subacuminate. What may be the homologue of peglike sclerotization of more typical crochets (as in Ceratophyllids) is

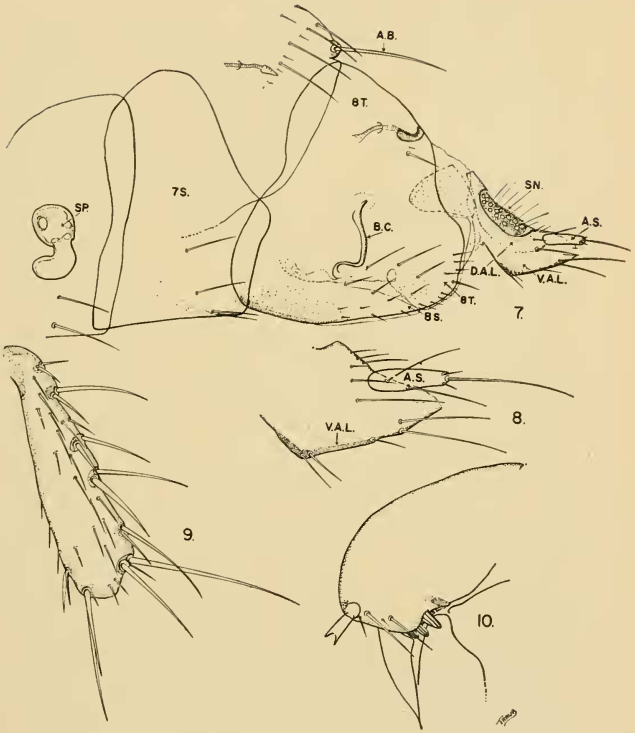

PLATE III. AGASTOPSYLLA PEARSONI

Fig. 7, modified abdominal segments, female; fig. 8, ventral anal lobe and anal stylet; fig. 9, metatibia, male; fig. 10, outline of head, female.

in this case apical, at apex of sclerotized inner tube. Crescent sclerite (*C.S.*) conspicuous above well-developed apodemal strut (*A.P.S.*). Penis rods (*P.R.*) uncoiled, fairly long. Aedeagal apodemal rod (*A.A.R.*) present, arising from base of aedeagus. Vesicle (*V.*) apparent at apex of penis rods (when *in situ*), but weakly sclerotized.

Tenth abdominal segment with dorsal lobe of proctiger (fig. 4, *D.L.P.*) very long and narrow; with dorsal portion fairly well sclerotized and with a dorsomarginal fringe of bristles, of which the apical one is relatively long; ventral lobe of proctiger (*V.L.P.*) subparallel to dorsal and equally long and narrow, with ventromarginal subapical and apical bristles; sensilium (*SN.*) fairly flat, with about sixteen sensory pits on a side.

Female (fig. 7).—Seventh sternum (*7S.*) with ventral half of caudal margin slightly convex dorsally and ventrally, its major portion fairly straight, ventral margin thickened. Seventh sternum apparently with but four bristles, of which two are ventromarginal. Eighth tergum (*8T.*) very long; ventral margin anteriorly thickened; with two bristles (one greatly reduced) beneath the vermiform, curved spiracle; subventral portion with six relatively small bristles and, in addition, three much smaller ones; a ventromarginal row of six equally short bristles; caudal margin with four or five fairly small bristles. Eighth sternum (*8S.*) weakly sclerotized, fairly long, somewhat narrowed apically; without bristles. Anal segment well separated from eighth tergum. Dorsal anal lobe of proctiger (*D.A.L.*) weakly sclerotized, with two or three small thin dorsomarginal bristles, a longer one mesad to stylet, one or two short median ones and a longer ventral bristle. Anal stylet (*A.S.* and fig. 8) about four times as long as broad; with a long apical bristle flanked by a short dorsal and ventral bristle. Ventral anal lobe (*V.A.L.*) weakly sclerotized, except for ventral margin; angled; with two relatively short bristles at angle, two longer subapical bristles, and a shorter marginal one between the two sets; the paratype with three more marginal bristles and also with three apical long bristles (lacking in allotype). Spermatheca (*SP.*) lying in an abnormal, turned position but with a relatively rounded large head, which probably bears a dorsal hump, and with tail somewhat longer than head. Bursa copulatrix (*B.C.*) in the main shaped like a slightly crooked finger.

Remarks.—The species is named for O. P. Pearson, to whom I am indebted for collecting much of the material discussed in this paper.

The species is apparently highly variable, as can be seen from the description.

Agastopsylla nylota, new species

Figs. 11-16.

Type. — Holotype, male, ex "*Eligmodontia* sp., *Akodon jelskii* or *Phyllotis darwini.*" PERU: Dept. Junin, Carhuamayo, elev. 14,500 ft., 22 Feb. 1946, coll. C. C. Sanborn for

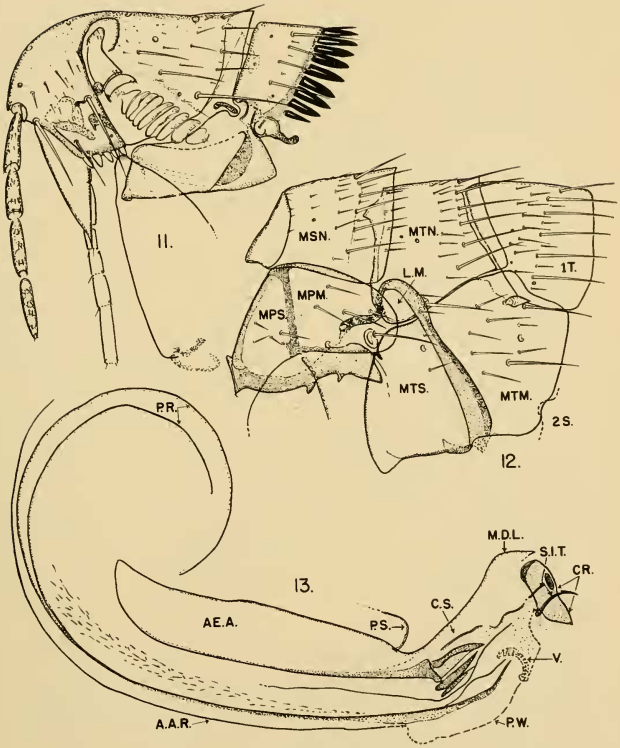

PLATE IV. AGASTOPSYLLA NYLOTA

Fig. 11, head, male; fig. 12, thorax; fig. 13, aedeagus.

the Chicago Natural History Museum. (No other specimen known.) Deposited in collections of the Chicago Natural History Museum.

Diagnosis.—Near *A. pearsoni* sp. nov., but readily separated as follows: Digitoid *F.* (fig. 14) longer, apically upturned and somewhat pointed, not truncate (fig. 4, *F.*). Crochet of aedeagus (fig. 13, *CR.*) about three times as long as broad, not twice (fig. 3, *CR.*). Male eighth sternum (fig. 16) with eleven bristles, not eight (fig. 6). The shape of the digitoid and the absence of the patch of bristles on the seventh tergum serve to distinguish this species from *A. boxi* J. & R. 1923.

The following description stresses only differences from *A. pearsoni.* Head (fig. 11) with preantennal region bearing an anterior row of six very small bristles, two large ventromarginal bristles, and a long bristle inserted above the vestigial eye. Vestigial genal ctenidium consisting of four or five very pale spines. Postantennal rows of bristles arranged 2-4-5, the ventralmost the longest in each instance. Mesonotum (fig. 12, *MSN.*) with three rows of bristles, the first very incomplete. Mesepisternum (*MPS.*) with three small bristles and a somewhat larger fourth near ventrocaudal angle. Metepimere (*MTM.*) with bristles arranged 5-5, of which apparently second and fourth bristles in last row smaller than others. Meso- and metatibia with five dorsal notches bearing a pair of bristles; with a single short dorsal bristle between the second and third pairs; and two single bristles between the fourth and fifth (apical) pairs, the ventralmost of these single bristles much longer than the uppermost; with fourteen or fifteen small lateral bristles near this dorsal margin; with five such lateral bristles near ventral (apparent anterior) margin, all distad of midpoint.

Measurements of tibiae and segments of tarsi (petiolate base deleted) shown in microns:

		Tarsal Segments				
Leg	Tibia	I	II	III	IV	V
Pro-	138	46	42	37	32	78
Meso-	230	74	64	51	37	83
Meta-	295	207	124	75	46	83

First tergum (fig. 12, *1T.*) with three rows of bristles. Typical terga with three rows of bristles, the first row incomplete. Eighth sternum (fig. 16) with eleven bristles, all on ventrocaudal third. Immovable process of clasper (fig. 14, *P.*) with two long apical bristles, between which a smaller intermediate marginal bristle and an equally small submarginal one. Digitoid or movable finger *F.* nearly five times as long as broad; apex somewhat crooked, inclined cephalad; caudal margin with a longish bristle near midpoint and an equally long bristle above and below it, with one or no shorter proximal birstle and about four short, more distal bristles; subapically with about three bristles, one of which may be long (the two sides varying somewhat regarding chaetotaxy).

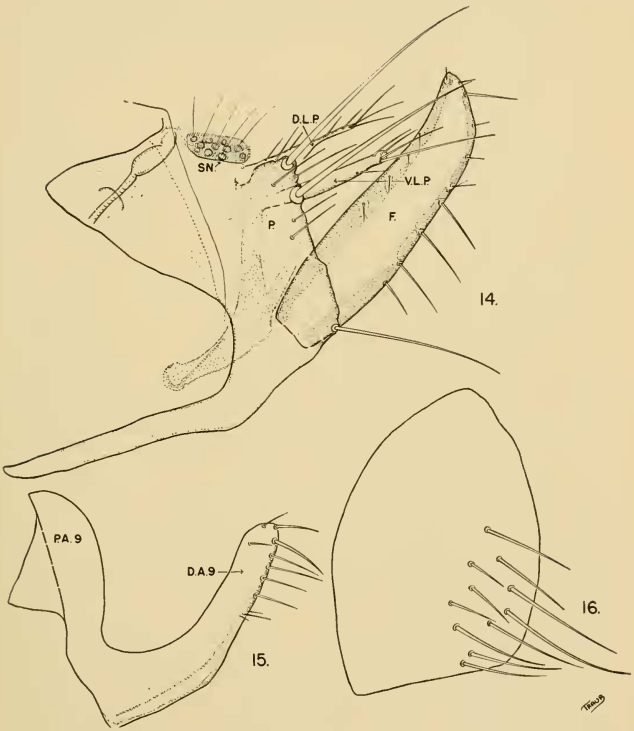

PLATE V. AGASTOPSYLLA NYLOTA

Fig. 14, claspers and tenth segment; fig. 15, ninth sternum; fig. 16, eighth sternum.

Ninth sternum (fig. 15) with proximal arm (*P.A.9*) slightly longer than distal arm; proximal arm only about two and one-half times as long as broad at lateral subapical angulate expansion. Distal arm of ninth sternum with about eight or nine fairly long marginal bristles, of which apical one or two are slightly thicker than the others. Aedeagus (fig. 13) essentially of same type as in *A. pearsoni* new species, but with crochet (*CR.*) with longitudinal axis fairly straight and nearly three and one-half times as long as broad.

Agastopsylla hirsutior, new species

Figs. 17-21.

Type.—Holotype, female, ex *Akodon* (*Chrocomys*) *pulcherrimus*. PERU: Caccachara, 50 miles southwest of Ilave, elev. 16,000 ft., 5 Oct. 1946, coll. O. P. Pearson. (No other specimen known.) Deposited in collections of Chicago Natural History Museum.

Diagnosis.—Separated from all known species by the fact that the metatibia (fig. 20) bears a total of about twenty-two lateral and/or subdorsal bristles (in addition to the marginal dorsolateral bristles, which are usually large and paired) instead of a maximum of fifteen (fig. 9). Also unique in the presence of three and one-half rows of bristles on the typical abdominal terga. In *A. boxi* J. & R. 1923 there are three rows on the abdominal terga, although the anteriormost have a few extra bristles, while the three other species known have but two and one-half rows of bristles. Further distinctive in that the ventral portion of the eighth tergum (fig. 21, *8T.*) bears ten or twelve long bristles (excluding marginals), not a maximum of five or six (fig. 7). The upward sweep of these long bristles, on the ventral portion of the eighth tergum, is also diagnostic. The caudad-directed crook of the bursa copulatrix (fig. 21, *B.C.*) readily distinguishes this new species from *A. boxi*.

Description.—(Only differences from *A. pearsoni* are included). Head (fig. 17) with two small bristles at base of maxillary palpus. Preantennal region with only two long ventromarginal bristles, one of these near anterior portion of insertion of maxillary lobe, the other near insertion of labium. Genal ctenidum of five spines, the fifth, nearest the genal lobe, even paler than the others and very difficult to see. Mesonotum (fig. 19, *MSN.*) with four rows of bristles, the first two of which are incomplete. Mesonotal flange with five pseudosetae on each side. Mesepisternum (*MPS.*) with five or six bristles. Mesepimere (*MPM.*) with seven or eight bristles. Metanotum (*MTN.*) with three rows of bristles; a fourth row represented by about two bristles. Metepisternum (*MTS.*) apparently with about seven bristles near upper caudal margin, most small. Metepimere (*MTM.*) with about ten or eleven bristles, three or four of which are small. Metatibia with about twenty-two bristles scat-

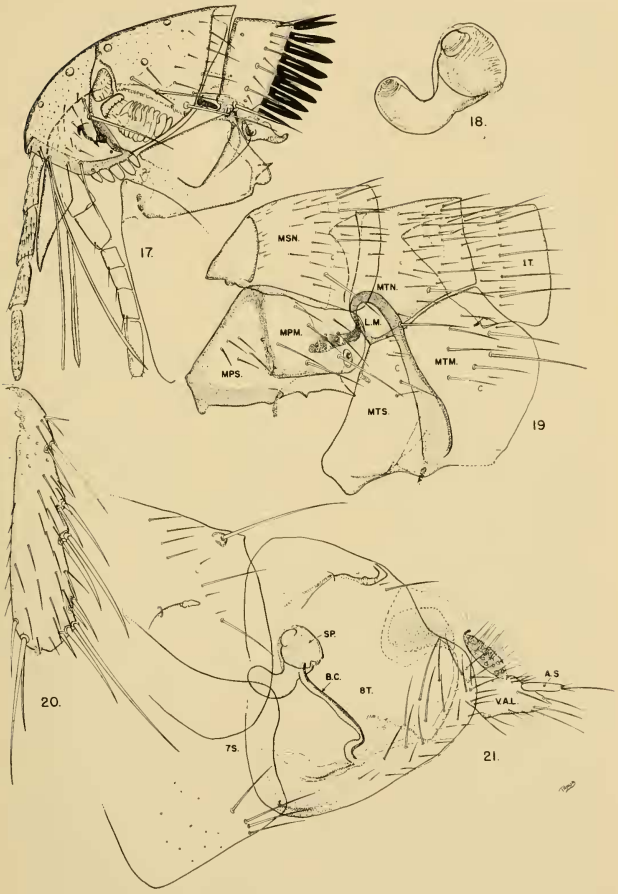

PLATE VI. AGASTOPSYLLA HIRSUTIOR

Fig. 17, head, female; fig. 18, spermatheca; fig. 19, thorax; fig. 20, metatibia; fig. 21, modified abdominal segments, female.

tered over the lateral surface, but proximo-anterior bare. Measurements of tibiae and segments of tarsi (petiolate base deleted) shown in microns:

		Tarsal Segments				
Leg	Tibia	I	II	III	IV	V
Pro-	138	47	51	37	33	78
Meso-	253	87	83	55	37	87
Meta-	320	220	138	96	51	96

First tergum (*1T.*) with three rows of bristles; a fourth row indicated by a few additional bristles. With seven to eleven bristles per side in third row of bristles on typical terga. Typical sterna with six to eight bristles, of which two or three are usually quite small and inserted cephalad to the larger ones. Seventh sternum (fig. 21, *7S.*) with dorsal half of caudal margin concave; ventral half with a short dorsal lobe, remainder of margin slightly concave. Seventh sternum with three or four fairly long bristles in a row near ventral margin. The ten or twelve fairly long subventral bristles on the eighth tergum (*8T.*) roughly arranged in two longitudinal rows. Ventral anal lobe (*V.A.L.*) with marginal bristles arranged as follows: one at anterior angle, one fairly adjacent, one at midpoint, one at three-fourths mark, one subapical (the longest); with a submarginal bristle above that at midpoint and that near apex. Spermatheca (*SP.* and fig. 18) with a distinct broad dorsal hump; the head slightly subovate, broadest subdorsally; tail somewhat longer than head, upturned, but not appreciably extending further dorsad than head.

The name was suggested by the fact that this species is characterized by possessing a relatively greater number of bristles than do the other known forms.

Comment on the Genus Agastopsylla J. & R., 1923.

Although in the original description, *Agastopsylla* Jordan & Rothschild (1923) was stated to be near *Neotyphloceras* Roths., 1909, it is felt that the genus is closer to *Ctenophthalmus* Kolenati, 1856. In both genera the lateral metanotal area is comparatively tall and is convex dorsally; the female eighth tergum is comparatively very long; the anal segments of the female are essentially similar; the male claspers and ninth sternum are of the same type, even as to the insertion of the digitoid; the eighth sternum is relatively unmodified, and is rather broad. The aedeagus of *Agastopsylla* resembles that of *Ctenophthalmus*, which has been described and figured by Traub (1950). Thus, the sclerotized inner tube is hardly armored, is only somewhat oblique in position, its sides subparallel and flanked by large crochets which are broader than long, the crochets not projecting distad of the endchamber. In *Agastopsylla*, however, the dorsal rib of the aedeagal apo-

deme projects caudad as a proximal spur, instead of the lateral plates being dorsally arched and fused into a sail. The genal ctenidium of *Agastopsylla* also reminds one of *Ctenophthalmus*, although in the former genus it is more oblique and contains four or five spines, not just three. The fact that in *Agastopsylla* the spines are very short and pale and are variable in number, at times differing on opposite sides of an individual, suggests that there is an evolutionary tendency in the genus towards complete reduction of the comb. The key published by Jordan (1948) was not meant to include all the New World genera; nevertheless *Agastopsylla* therein can be readily run down to what is designated as the family Ctenophthalmidae, subfamily Ctenophthalminae. It is emphasized that Jordan did not mention any of the above characters in the key. Dr. Jordan (*in litt.*) has kindly stated that he considers these genera to be in the same subfamily (Ctenophthalminae), but in different tribes.

In many respects the thorax of *Agastopsylla* closely resembles that of *Anomiopsyllus* Baker, 1904, and its allies (*Conorhinopsylla* Stewart, 1930, *Megarthroglossus* Jordan and Rothschild, 1915, *Callistopsyllus* Jordan and Rothschild, 1915, and *Stenistomera* Rothschild, 1915). In the Anomiopsyllini the metepimere is partially fused with the metanotal collar, and this is also usually the case with *Agastopsylla*. As in the Anomiopsyllini, in *Agastopsylla* there is a reduction in the number of bristles and spines, and in the size of the eye, as compared with many other genera in the family. The labial palpi and mouthparts, on the other hand, are relatively elongate. These features are considered as examples of convergent evolution rather than as indicative of close relationship with *Anomiopsyllus* and allies, and it is believed that all of these fleas are forms that characteristically inhabit the nests of the hosts, and are adapted accordingly.

Tetrapsyllus bleptus (Jordan and Rothschild, 1923)

Figs. 22-27.

Parapsyllus bleptus Jordan and Rothschild, 1923, Ectoparasites 1: 368-369, 370, fig. 383. Dalla Torre, 1924, Catal.: 18.

Tetrapsyllus bleptus Jordan, 1931, Novit. Zool. 37: 135. Jordan, 1942, Eos. 18: 10. Jordan, 1942, Rev. Inst. Bacteriology, Malbran, 10 (4): 421. Costa Lima and Hathaway, 1946, Monog. Inst. Oswaldo Cruz, No. 4: 148.

Although five species of *Tetrapsyllus* Jordan 1942 have been described, the males of only two are known. The male of *T. bleptus* is here described and figured for the first time.

Type.—Allotype, male, ex *Phyllotis arenarius;* PERU: Caccachara, 50 miles southwest of Ilave, elev. 16,000 ft., coll. O. P. Pearson, 5 Oct. 1946. Deposited in collections of Chicago Natural History Museum.

Description.—Head (fig. 22).—Clypeal tubercle vertical, acutely triangular; apex hardly projecting beyond margin, its groove well sclerotized. Micropunctations thinly scattered over most of preantennal region above eye and over virtually all of postantennal region except near ventrocaudal angle. Preantennal region with a row of about nine ventromarginal bristles extending from base of maxillary lobe to apex of gena; that near maxillary lobe by far the longest—reaching well beyond apex of second segment of maxillary palp. With two small bristles at anteroventral angle of head, below labrum. With a long bristle along antennal groove, above eye; a slightly shorter bristle at anterior angle of eye; this last one accompanied by two or three much smaller bristles. Labial palpi extending slightly beyond apex of forecoxae. Pigmented portion of eye with an excised median ventral portion; upper anterior margin slightly concave or straight. Scape of antenna with a row of anteromarginal or submarginal small thin bristles, one or two such bristles submedian; another row along apical margin. Second antennal segment with some bristles which reach beyond center of club. Postantennal region with a long bristle just above center of fringe of row of bristles bordering antennal fossa; a longer bristle near ventrocaudal angle; a row of bristles along caudal margin of head, the row including small intercalary bristles. Pronotum with a row of six or seven long bristles and intercalaries; ratio of length to height 7:9 (including flange); with a subdorsal mesal pseudoseta on each side. Mesonotum (fig. 23, *MSN.*) with three rows of bristles, those in last row the longest and accompanied by intercalaries; the first two rows abbreviated; flange with five or six mesal pseudosetae on each side. Mesepisternum (*MPS.*) with two bristles, one much larger than other, near ventrocaudal corner. Mespimere (*MPM.*) with two long bristles near ventral margin; one of these adjacent to suboovate spiracle. Mesosternum (*MST.*) with a relatively large unsclerotized area immediately below mesepisternum. Metanotum (*MTN.*) with two rows of bristles, the first row quite short. The second with intercalary small bristles between the long ones. Lateral metanotal area (*L.M.*) more than one and one-half times as long as broad; its longest diameter vertical; slightly narrowing ventrally; its dorsal ridge (*R.*) well sclerotized; its ventral ridge (*V.R.*) weak but distinct; metepisternum (*MTS.*) lacking the internal tubercle or squamulum present in so many fleas; with a single submedian bristle. Pleural arch (*PL.A.*) strongly and somewhat acutely convex, forming a socket-like arrangement for the rod separating the metepisternum and metepimere. With three to seven bristles on metepimere (*MTM.*) (three and five in holotype), excluding one or two very small ones near cordate-shaped spiracle in Junin male but not in allotype. Measurements of tibiae and segments of tarsi of allotype (petiolate base deleted) shown in microns:

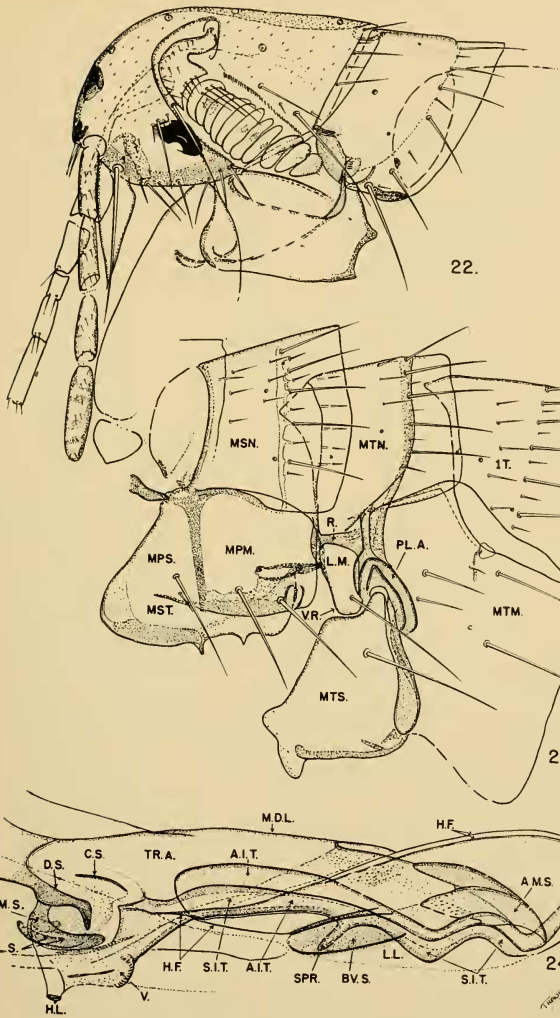

PLATE VII. TETRAPSYLLUS BLEPTUS

Fig. 22, head, male; fig. 23, thorax; fig. 24, aedeagus.

		Tarsal Segments				
Leg	Tibia	I	II	III	IV	V
Pro-	161	51	59	42	37	83
Meso-	220	92	92	55	42	87
Meta-	300	207	138	78	46	92

Abdomen.—First tergum (fig. 23, *1T.*) with two rows of bristles and four small apical teeth on each side. Basal sternum with seven to eleven small thin bristles per side. Typical terga with both rows of bristles extending ventrad slightly below level of spiracle; the bristles of second row long and slender. Typical sterna apparently with a row of three to six or seven bristles, with a few small bristles in front of the row. With a single long antepygidial bristle (fig. 25, *A.B.*).

Modified Abdominal Segments (fig. 25).—Eighth tergum (*8T.*) relatively small (as compared with Ceratophyllids), extending caudad to level of center of the fairly straight sensilium (*SN.*) and ventrad to level of subglobular seventh spiracle. Eighth sternum (*8S.*) large, unmodified, extending caudad to beyond angle of ninth sternum and dorsad to about level of seventh spiracle; with apparently at least twelve bristles, of which the caudalmost four or five are longer than the others; most bristles on ventral fifth of segment, and only one as far dorsad as near base of manubrium.

Immovable process of clasper (*P.* and fig. 27) broad, somewhat rounded; with two subapical long bristles, two slightly longer marginal bristles above base of digitoid, probably representing the acetabular bristles (in mesal aspect of Junin male, these bristles well separated, as drawn, but on other side and in allotype, they are separated only by a distance equal to diameter of their bases); with three to five long thin marginal bristles below these, and a row of five smaller bristles along margin, at base of manubrim; with about four dorsomarginal and three or four submarginal or subdorsal bristles; with two small apical bristles; with two or three submedian bristles below the above and and with a few scattered small bristles near the sclerotized notch at apical third of caudal margin. Movable finger or digitoid (*F.* and fig. 27) subconical, very slightly crooked apicad; nearly four times as long as broad at midpoint; anterior margin somewhat sinuate, posterior margin with a row of about eight thin bristles, widely spaced except for the two or three subapical; with about five or six mesal and two or three lateral smaller, median bristles. Manubrium (*MB.*) gently curved, apex broadly rounded. Ninth tergum (*9T.*) quite reduced, but broader than its apodeme (*T.AP.9*).

Ninth sternum roughly boomerang-shaped; its proximal arm (*P.A.9*) narrowed near base, but apically broadened and somewhat bifid, the upper branch broad, the lower subacuminate. Distal arm of ninth sternum (*D.A.9* and fig. 26) long and narrow, gradually narrowing apically from midpoint on, with a ventral (apparently caudal) marginal row of fairly long thin bristles; apical half with dorsomarginal and median small thin lateral bristles.

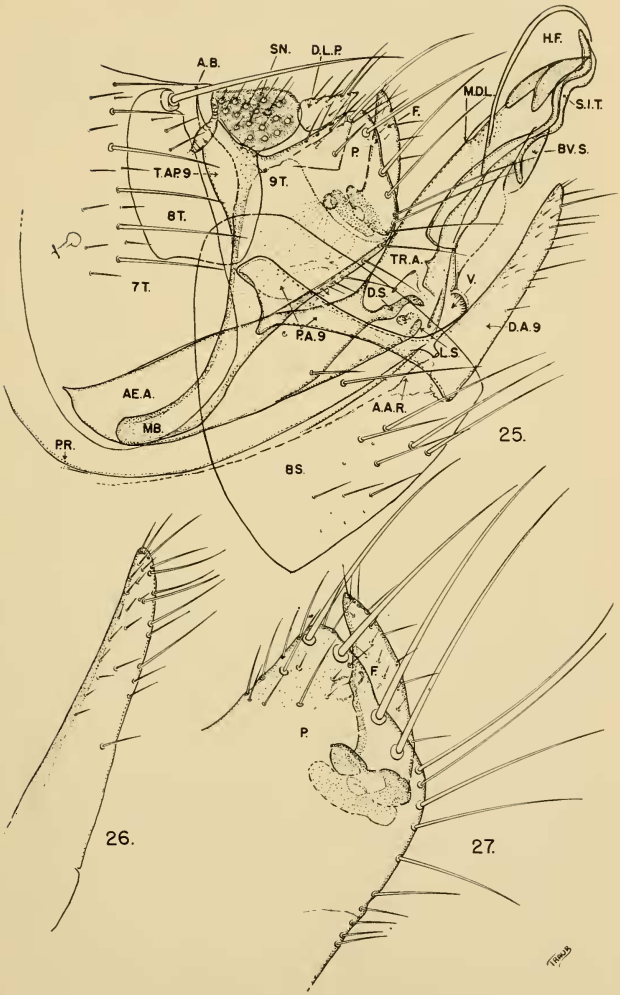

PLATE VIII. TETRAPSYLLUS BLEPTUS

Fig. 25, modified abdominal segments; fig. 26, distal arm of ninth sternum; fig. 27, process and digitoid of clasper.

The aedeagus is so unlike that of described fleas that it is best discussed by considering the organ as being a highly modified type but one that can be nevertheless homologized to a certain extent with *Polygenis* (vide Traub, 1950, pp. 65 and 105, plate 38, fig. 5 and plate 39, fig. 1). Aedeagus proper greatly elongated, the portion distad of the apodemal strut (*L.S.*, *D.S.*, and fig. 24) as long as the aedeagal apodeme (*AE.A.*). Trough (*TR.A.*) of endchamber broad and distinct as it extends proximad of narrow crescent sclerite (*C.S.*). Lateral lobes (*L.L.*) so weakly sclerotized as to be virtually inapparent. Median dorsal lobe (*M.D.L.*) almost straight, not strongly arched apically, bifid subapically and distally produced on each side as a long stout saggitate sclerite, the apico-median sclerite (*A.M.S.*), which is somewhat talon-shaped and downcurved, its apex flanking the sclerotized inner tube. Crochets apparently lacking. The endchamber covered by a conspicuous pair of hoodflaps (*H.F.*) which extend on each side apicad and far dorsad of the apex of the sclerotized inner tube (*S.I.T.*), the dorsal arch of the flap suggesting in appearance the median dorsal lobe of true Ceratophyllid fleas. The flaps extend far proximad to near base of inner tube on each side as an acuminate lobe. Sclerotized inner tube remarkable, serpentine; apical half doubly sinuate; extending virtually entire length of endchamber; dorsal margin extending beyond *A.M.S.*, with apex upturned; ventral margin apparently stops short of this sclerite, with a ventral spur (*SPR.*) proximad of midpoint and pointing ventrocephalad. Armature of inner tube (*A.I.T.*) flanking and paralleling inner tube for most of its length; dorsal margin of armature extending above inner tube for a distance subequal to diameter of tube, coiling with tube and produced apicad as far as dorsal part of tube; ventral margin approximating that of tube, indistinct apicad of spur. On each side, laterad to spur of inner tube, a conspicuous structure suggesting a partially-opened mussel as viewed from the front, herein designated as the bivalve sclerite (*BV.S.*). This sclerite broader than spur, with margins well sclerotized, enclosing a multitude of densely packed conspicuous spicules or granules. A patch of similar spicules dorsad of the bivalve sclerite, near dorsal margin of aedeagus at separation of branches of median dorsal lobe. With a well-developed vesicle (*V.*) just apicad and ventrad of apodemal strut. Base of aedeagal pouch wall indicated by a distinct thumblike sclerotization (*HL.*) below apodemal strut; probably homologous with heel of *Polygenis*. Apodemal strut consisting of the usual stout lateroventral sclerite (*L.S.*), a mesal, more dorsal, less densely sclerotized portion (*M.S.*) and a dorsal downward projecting stout sclerite (*D.S.*). Penis rods (P.R.) short, uncoiled. Aedeagal apodemal rod (Fig. 25, *A.A.R.*) reduced, but apparent, arising from heel of aedeagus, but also with weak elements connecting to base of ninth sternum.

Tenth abdominal segment with dorsal lobe of proctiger (*D.L.P.*) triangular in lateral aspect; with median and marginal bristles. Ventral lobe of proctiger feebly sclerotized, indistinct.

Comment of the Genus Tetrapsyllus Jordan

Inasmuch as the only other known males in the genus (*T. amplus* J. & R. 1923 and *T. corfidii* R. 1904) also have a serpentine sclerotized inner tube, as well as a ventral spur, it is probable that these are characteristic of the genus.

Records

Among the material collected by O. P. Pearson were a very few specimens of the genera *Hectopsylla, Ectinorus* and *Parapsyllus* s. lat. which could not be properly assigned to species because either only females were represented or the specimens were severely damaged. Records for the three species of *Agastopsylla* have been given above. Data for six additional species are as follows:

Cleopsylla townsendi Rothschild, 1914, Ex *Chroeomys pulcherrimus*, Peru: Caccachara, 50 miles southwest of Ilave, elev. 16,000 ft., 5 Oct. 1946, coll. O. P. Pearson, 4 ♂, 7 ♀.

Dysmicus viscachae Wagner, 1937, Ex *Lagidium peruanum*, loc. cit., 14 Sept. 1946, 1 ♂, 5 ♀. Ex *Lagidium peruanum*, Peru: Puno Province, Santa Rose, elev. 14,000 ft., 31 July 1946, coll. O. P. Pearson, 4 ♂, 5 ♀.

Neotyphloceras c. crassispina Roths., 1914, Ex *Abrocoma*, Peru: Caccachara, 50 miles southwest of Ilave, elev. 16,000 ft., 11 Oct. 1946, coll. O. P. Pearson, 1 ♂. Ibid., but 5 Dec. 1946, 3 ♂, 2 ♀. Ex *Auliscomys boliviensis*, ibid., 1 ♂. Ex *Chinchillula sahamae*, loc. cit., 7 Oct. 1946, 1 ♀. Ex *Chroeomys pulcherrimus*, ibid., 2 ♂, 6 ♀. Ex *Phyllotis arenarius*, loc. cit., 5 Oct. 1946, 1 ♂.

Plocopsylla sp. nov. (being described elsewhere).

Rhopalopsyllus cacicus Jordan & Rothschild, 1908, Ex *Phyllotis amicus*, Peru: Matucana, March 1940, collector unspecified, 1 ♀.

Tetrapsyllus bleptus (Jordan & Rothschild, 1923), (Allotype data above.) Ex *Abrocoma*, Peru: Caccachara, 50 miles southwest of Ilave, elev. 16,000 ft., 11 Oct. 1946, coll. O. P. Pearson, 1 ♂, 1 ♀. Ibid., but 5 Dec. 1946, 1 ♂. Ex *Chinchillula sahamae*, loc. cit., 7 Oct. 1946, 2 ♀. Ex *Chroeomys pulcherrimus*, loc. cit., 10 Oct. 1946, 3 ♀, Ex *Chroeomys pulcherrimus*, loc. cit., 5 Oct. 1946, 1 ♂. Ex *Ctenomys opimus*, loc. cit., 30 Sept. 1946, 1 ♀. Ex *Punomys lemminus*, ibid., 1 ♂, 4 ♀. Ex *Eligmodontia* sp., *Akodon jelskii* or *Phyllotis darwini*, Peru: Dept. Junin, Carhuamayo, elev. 14,500 ft., 22 Feb. 1946, coll. C. C. Sanborn, 1 ♂.

Acknowledgments.—Thanks are due to Miss Phyllis Johnson, of the Army Medical Service Graduate School, Washington, for having criticized the manuscript. Dr. Karl Jordan, F.R.S., of the British Museum, Tring, who has so considerately helped other workers on innumerable occasions, again gave up some of his valuable time to verify the status of *A. pearsoni*, new species.

REFERENCES

Fuller, H. S., 1942. Notes on Neotropical Siphonaptera. Rev. de Ent. (Brasil) 13(1-2): 39-44.

Jordan, K., 1948. Chapter on fleas *in* Smart, J., "Insects of Medical Importance," pp. 211-245. British Museum, London.

————————, 1950. Notes on a Collection of Fleas from Peru. Bull. World Hlth. Org. 2(34): 597-609.

———— and N. C. Rothschild, 1923. Ectoparasites 1: 316.

Macchiavello, A., 1948. Siphonaptera de la Costa Sur-Occidental de America (Primera Lista y Distribucion Zoo-Geografica). Bull. Pan Amer. Sanit. Bur. 27(5): 412-460. (21 refs.)

Traub, R., 1950. Siphonaptera from Central America and Mexico. A Morphological Study of the Aedeagus, with Descriptions of New Genera and Species. Zoological Memoirs of the Chicago Natural History Museum 1(1): 1-127. (Plates 1-54).

THE STATUS OF THE GENUS PARABEZZIA MALLOCH

(DIPTERA, HELEIDAE)

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Malloch proposed the genus *Parabezzia* for three Nearctic species, *petiolata* n. sp., which he made the genotype, *Ceratopogon inermis* Coquillett, and *Bezzia elegantula* Johannsen. He distinguished these species from *Probezzia* Kieffer by their petiolate media, a character which is now known to exhibit variation in other related genera. Unfortunately the generic classification of the Heleidae rests largely on female characters. Since the female of *petiolata* has not been known, it has been impossible to do more than guess at the generic relationships of *Parabezzia*. Moreover, the male genitalia, which usually offer good generic characters, have never been described for *petiolata*.

The male lectotype and a male paratype of *petiolata* have been borrowed from the Illinois Natural History Survey through the kindness of H. H. Ross, and the female holotype of *Stilobezzia uncinata* Johannsen was borrowed from Cornell University through the courtesy of Henry Dietrich. The synonymy presented here is primarily a result of the study of this type material.

The genitalia of *petiolata*, which are here figured and described, indicate that *Parabezzia* is not closely related to *Stilobezzia*, as has been believed by recent workers, and that several species that have been assigned to *Parabezzia* do not belong there. Malloch's inclusion of *elegantula* was erroneous, this species falling within the subgenus *Eukraiohelea* of *Stilobez-*